DRAFT SITE INSPECTION PRIORITIZATION REPORT
FOR
WHITNEY BARREL CO.
WOBURN, MASSACHUSETTS

REVIEWED AND APPROVED
BY US EPA REGION I
Nancy Smith
DATE: 11-24-97

CERCLIS No. MAD019725324
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This document reviewed and accepted as FINAL

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Work Order No. 11098-021-001-2103-50

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Draft Site Inspection Prioritization Report
Whitney Barrel Co.
Woburn, Massachusetts

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Work Order No. 11098-021-001-2103-50

INTRODUCTION

The Roy F. Weston, Inc. (WESTON®) Superfund Technical Assessment and Response Team (START) was requested by the U.S. Environmental Protection Agency (EPA Region I), Office of Site Remediation and Restoration to perform a Site Inspection Prioritization (SIP) of the Whitney Barrel Co. property at 256 Salem Street in Woburn, Massachusetts. Tasks were conducted in accordance with the SIP scope of work and technical specifications provided by EPA Region I. A Site Assessment Report for the Whitney Barrel Co. property was prepared by GHR Engineering Associates, Inc. (GHR) on 23 December 1988. GHR collected a number of soil and groundwater samples from the property and concluded that the soil and groundwater was contaminated with a number of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and inorganic metals. On the basis of the information provided in the GHR report, the Whitney Barrel Co. SIP was initiated.

Background information used in the generation of this report was obtained through file searches conducted at the EPA Region I, Massachusetts Department of Environmental Protection (MA DEP), telephone interviews with town officials, conversations with persons knowledgeable of the Whitney Barrel Co. property, and conversations with other Federal, State, and local agencies.

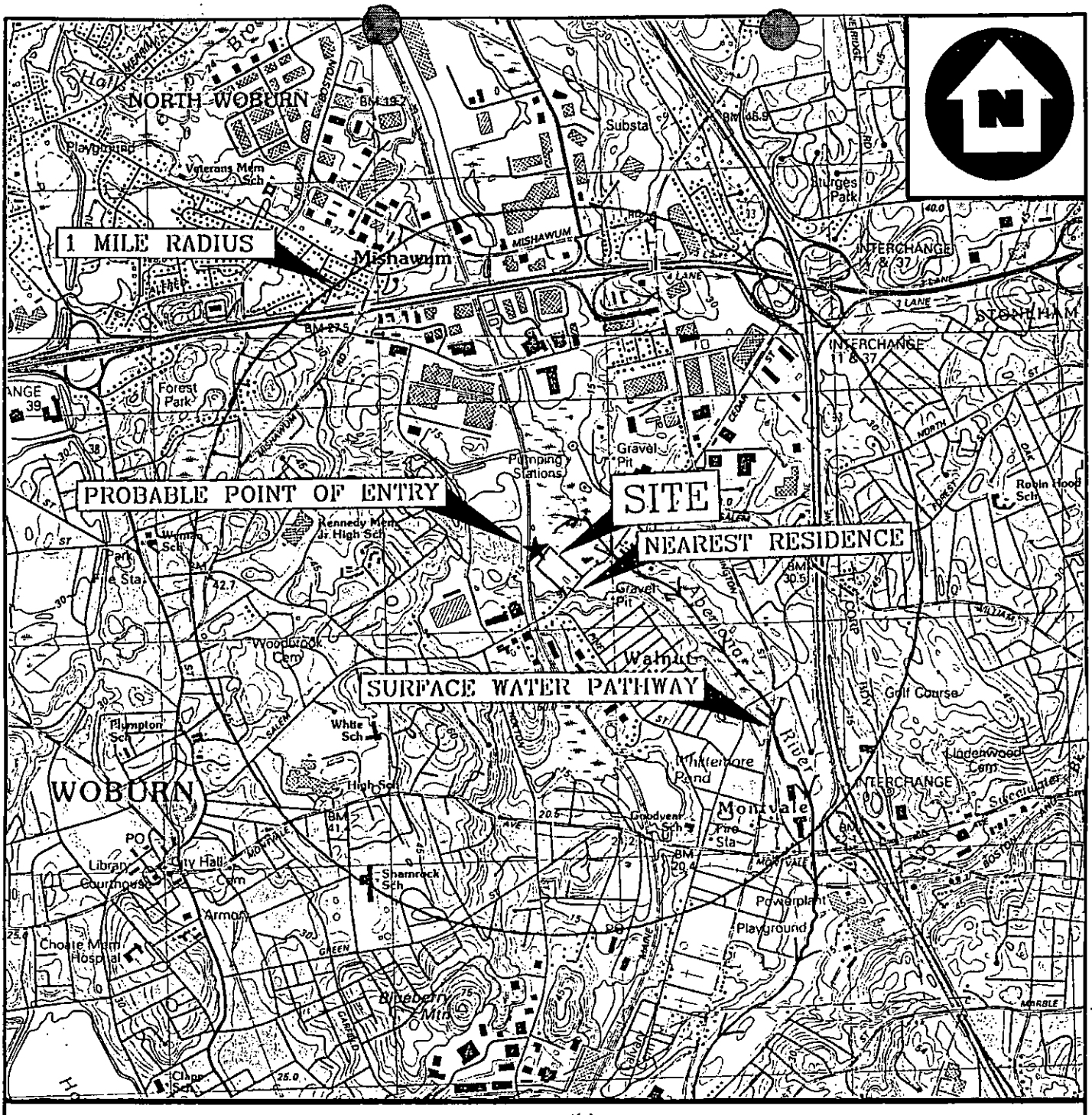
This package follows the guidelines developed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA Region I regulations such as those under the Resource Conservation and Recovery Act (RCRA) or other Federal, State, or local regulations. SIPs are intended to provide a preliminary screening of sites to facilitate EPA Region I's assignment of site priorities. They are limited efforts and are not intended to supersede more detailed investigations.

SITE DESCRIPTION

Whitney Barrel Co., Inc. is located at 256 Salem Street in Woburn, Middlesex County, Massachusetts on Lot No. 37, and comprises 2.72 acres of land. The site is bordered by Murphy's Waste Oil Co. to the west, Salem Street to the south, Aberjona Auto Parts, Inc. and the Metropolitan District Commission (MDC)/City of Woburn sewer easements to the east, and the J.J. Riley Leather Co./Wildwood Conservation property to the north (Figure 1) [33, p. 5]. The property is owned by Ms. Ruth Whitney, although all site business is handled by her son, Mr. Jack Whitney.

From 1950 until early 1985, the Whitney Barrel Co. operated as a drum, boiler, tank, and machinery reconditioning company.

Note: Text which appears in italics indicates original portions of the Site Inspection report which were either copied or paraphrased.



BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 15' U.S.G.S. QUADRANGLE(S):
BOSTON NORTH, MASS. 1985 AND READING, MASS. 1987.

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

QUADRANGLE LOCATION

LOCATION MAP

WHITNEY BARREL CO.

256 SALEM STREET

WOBURN, MASSACHUSETTS

HWRE

Civil•Environmental•Hydrologic•Structural•Environmental•Hazardous Waste Engineering

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
97-01-0038	S.R.	5/2/97

FILE NAME:	
HW146\LOCATION	FIGURE 1

OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS

Mr. John Whitney, Jr. (late husband of Ms. Ruth Whitney) purchased the property in 1949 for the purpose of operating a drum, boiler, tank, and machinery reconditioning company. From 1950 until early 1985, barrels (predominantly 55-gallon drums) were brought to the property by the truckload to be cleaned, refinished, and resold. Tanks of all sizes were also cleaned on site and then sold for scrap metal. Most barrels cleaned on the property reportedly came from food and cosmetic industries. In the earlier years of the Whitney Barrel Co. operation, some barrels still containing waste residues were received at the property for cleaning. These residues were reportedly drained from the barrels prior to washing and contained in a drum for off-site disposal. The company later made it general practice to accept only those barrels that were considered empty, and it became company policy that barrels containing residue were rejected or sent back to their source [33, p. 26].

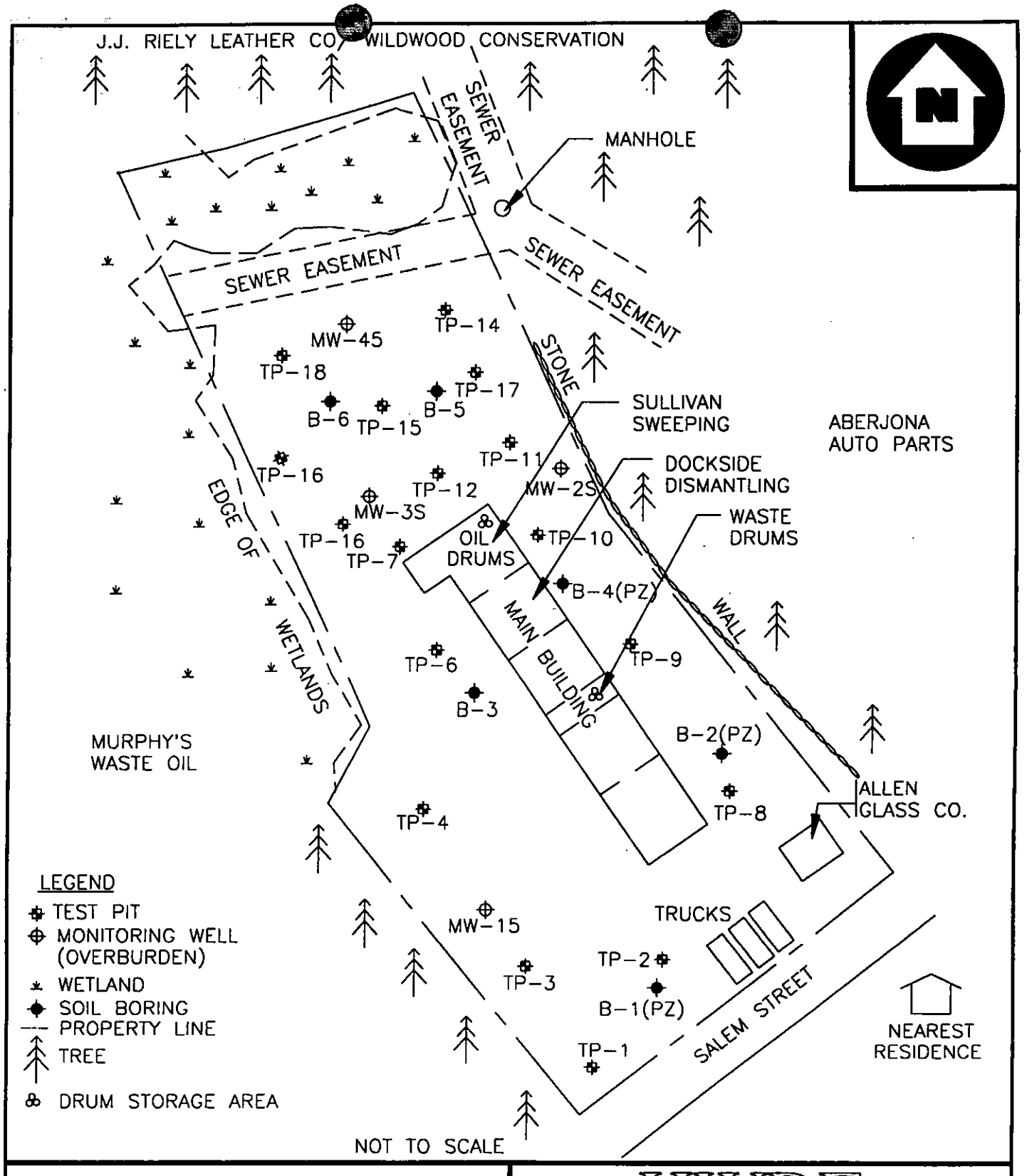
Two buildings were constructed on the property. One building was a small, two-story, wood-framed building used for office space. The second and main building was a larger warehouse building that housed the reconditioning operations (Figure 2) [33, p. 6].

During the reconditioning operations at the Whitney Barrel Co., barrels were steam cleaned with trisodium phosphate and a flake caustic wash solution. Wash water from this process was skimmed and then discharged manually to the City/Massachusetts Water Resource Authority (MWRA) sanitary sewer system via a floor drain located 5 feet inside the rear entrance of the main building. The oil and grease was skimmed off the wash water and drummed for off-site disposal. Any sludge that accumulated in the wash tank was drummed and collected for off-site disposal. Following the initial wash, barrels were steam rinsed. Rinse water was contained in the wash tank and also discharged manually to the City/MWRA sewer system via the floor drain [33, pp. 27-28].

The Whitney Barrel Co. had an Industrial User Permit (No. 43000288-8) issued in 1981 by the MDC for discharge to the on-site sanitary sewer. One permit violation, for high pH (11.25), was noted in a sampling report from an April 1983 MDC inspection of the Whitney Barrel Co. facility. The elevated pH was attributed to the caustic material used in the barrel washing. In 1983, the MDC also noted permit violations in regards to the Whitney Barrel Co. not submitting a discharge report or a compliance schedule [33, p. 28].

After washing, barrels were dried with a vacuum-type drier, reshaped, and buffed in preparation for painting. Barrels were painted with drum enamel paint thinned with Solvisol No. 5. Painting was performed in a small paint booth located in the main building. Any waste paint thinner was subsequently mixed with new paint and reused [33, p. 29].

A series of fires occurred at the property while the Whitney Barrel Co. was active. Woburn Fire Department records indicate that the first fire occurred in 1960. Subsequent fires occurred in 1965, 1967, 1972, 1973, 1977, 1979, and 1986. The most destructive fires occurred in 1977 and 1979. The 1977 fire destroyed the northern end of the main building, and the 1979 fire demolished the entire main building and its contents. Records completed by the Woburn Fire Department for the 1977 fire reported that chemicals and residue from used barrels were the main flame spread factor.



SITE SKETCH

WHITNEY BARREL COMPANY
256 SALEM STREET
WOBURN, MASSACHUSETTS

HWRE
Civil•Environmental•Hydrologic•Structural•Hazardous Waste Engineering•Surveying
REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
91-01-0038	M.H.	6/6/97

FILE NAME: HW146\SURFWATER

FIGURE 2

During the 1979 fire, barrels awaiting reconditioning exploded and were blown out of the building. After the fire of May 1979, the volume of barrel/tank reconditioning performed on the property was reported to be significantly reduced [33, p. 29].

In 1978, the Office of the Massachusetts Attorney General investigated the case against Whitney Barrel Co. involving the discharge of contaminated wastewater without a National Pollutant Discharge Elimination System (NPDES) permit. Whitney Barrel Co. had contracted Kingston Steel Drum of New Hampshire (Kingston) to clean barrels while Whitney Barrel Co.'s equipment was inoperable. Kingston agreed to clean the barrels on the condition that the contaminated wastewater from the reconditioning process be disposed of at the Whitney Barrel Co. property. On 13 December 1978, Kingston transported the wastewater to Whitney Barrel Co. to dispose of it in the MDC sewer. Both companies were brought to court by the Office of the Massachusetts Attorney General, charged with RCRA violations, and fined [6, p. 2].

In November and December 1980, Ecology & Environment, Inc. (E&E) conducted a Preliminary Assessment and a Site Inspection of the Whitney Barrel Co. property. During the investigation, E&E noted that the property had the appearance of a junkyard. There were many containers on site that were stacked three to four containers high and were severely rusted. There were also numerous pieces of machinery and trailers in various stages of deterioration. It was also noted that a strong volatile smell was emanating from the property. At the time of the inspection, empty drums with labels for malathion, acrylic lacquer thinner, and methylene chloride were noted. Several cardboard drums labelled trichloroisocyanuric acid were noted on the ground under a trailer near the northeast corner of the property. Following their inspection, E&E concluded that the potential hazard to the environment posed by this property was the disposal of hazardous material into the MDC sewer.

In February 1985, NUS Corporation Field Investigation Team (NUS/FIT) planned to install a monitoring well on the Whitney Barrel property as part of the Remedial Investigation (RI) of the Wells G & H Site in Woburn, Massachusetts. At a depth of 3.5 feet, the drilling rig encountered a layer of a sludge-like substance. The Organic Vapor Analyzer detected 250 parts per million (ppm) of total organics (non-methane) at the hole, and the drilling process was abandoned until a new health and safety plan could be developed. NUS/FIT conducted no further investigation of the Whitney Barrel Co. at that time [6, p. 3].

In May 1985, the Whitney Barrel Co. agreed to cease operations and pay a $5,000 fine [6, p. 2].

In June 1988, GHR conducted a Site Assessment of the Whitney Barrel Co. property. The property no longer housed Whitney Barrel Co. operations. Instead the site was used by a number of individuals and businesses who leased portions of the property from Ms. Ruth Whitney [33, p. 3].

During their investigation of the property, GHR excavated 17 test pits (TP-01 to TP-17), advanced 12 soil borings (B-3, B-5, B-6, and B-8), four of which were completed as piezometers (B-1, B-2, B-4, and B-7) and another four of which were completed as monitoring wells (MW-1S to MW-4S) [33, Section 4].

A number of soil and groundwater samples were collected during this investigation. The analytical results of these samples indicated the presence of VOCs, SVOCs, pesticides, PCBs, and inorganic metals in both the soil and groundwater [33].

In October 1996, during a 75-year flood event, the entire Whitney Barrel property was inundated with over 4 feet of water. During the flood, a number of barrels and pails of waste oil stored on the property released their contents on the property. The MA DEP was notified, and Zecco, Inc. (a Metcalf & Eddy Company) was dispatched to the property to perform a cleanup. According to Mr. Scott Sayers of the MA DEP, Zecco, Inc. absorbed as much of the waste oil as they could before allowing the rest to leach back into the soil. All of the drums that were generated by Zecco, Inc. during the cleanup were removed from the property [44].

On 24 April 1997, START personnel conducted an on-site reconnaissance of the Whitney Barrel Co. property. The current operator of the property, Mr. Jack Whitney, had cleaned up much of the property since the flood in October 1996. Portions of the property are currently leased by three different businesses. The small office building is utilized by Allen Glass Co., a glass and mirror business. The north end of the main building is used as a garage by Sullivan Sweeping, a street sweeping business. The rest of the main building is used as storage space by Dockside Dismantling Co., a demolition business that dismantles buildings and engines [38, p. 2].

The northern half of the main building is a new edition to the older southern half. This new edition has concrete floors and aluminum siding. No floor drains are located in this area. Sullivan Sweeping's garage is located in this half as well as a storage area housing a bulldozer and a large number of empty 55-gallon and fiber drums. The older southern half has three separate rooms with wooden floors and rusted metal siding. In the northernmost room, START personnel observed a number of drums, one of which, according to Mr. Jack Whitney, contained waste oil. Two others had hazardous waste labels on them and apparently contained hazardous materials pumped from the sewer manhole along with some Speedy-Dry. Mr. Whitney stated that these drums have been temporarily stored in this area and have been awaiting removal since 1989. It is certain that these drums were under water during the flood. The other two rooms in this area are used by Dockside Dismantling to store equipment and engine parts. Oil staining was observed on the floor in one area around some engine parts [38, pp. 1-4].

Oil-stained soils were observed in scattered areas throughout the rest of the property. A large pile of rubble containing wood, concrete, and various plastics and scrap metal was observed at the northern end of the property [38, pp. 1-4].

Three monitoring wells were observed east of the main building. One of the wells appeared to be filled with soil, one was locked, and the other was unlocked with no cap. Three other monitoring wells were observed at the north end of the property alongside the wetland area. The wells were capped and locked [38, pp. 1-4].

Due to the availability of third party soil and groundwater data, START personnel did not collect samples as part of the Whitney Barrel Co. SIP [38, pp. 1-4].

Table 1 presents identified structures or areas on the Whitney Barrel Co. property that are documented or potential sources of contamination, the containment factors associated with each source, and the relative location of each source.

Table 1

Source Evaluation for Whitney Barrel Co.

Source Area	Containment Factors	Spatial Location
Contaminated Soil	Evidence of migration	Throughout property
Waste Drums	Indoors, no liner	Middle room of warehouse
Oil Drums	Indoors, liner under container area	North end of warehouse

[38, pp. 1-6]

Table 2 summarizes the types of potentially hazardous substances which have been disposed, used, or stored on the Whitney Barrel Co. property.

Table 2

Hazardous Waste Quantity for Whitney Barrel Co.

Substance	Quantity or Volume/Area	Years of Use/Storage	Years of Disposal	Source Area
Soil Contaminated with: VOCs (Benzene, Ethylbenzene, Toluene); SVOCs (Benzo(a)pyrene, Naphthalene); PCBs; metals (Arsenic, Mercury, Lead)	2.72 acres	Approx. 30	Approx. 30	Contaminated Soil
Motor oil, Hydraulic oil	2 drums	Approx. 1-2	NA	Oil Drums
Waste Oil, Unknown Hazardous Materials	3 drums	Approx. 8-9	NA	Waste Drums

Approx. = Approximately
NA = Not Applicable
VOCs = Volatile Organic Compounds
SVOCs = Semivolatile Organic Compounds
PCBs = Polychlorinated Biphenyls
[38, pp. 1-6]

There are a number of other potential sources of contamination in the vicinity of the Whitney Barrel Co. Approximately five State-listed Sites are located within 0.5-radial miles of the property. Three Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) facilities are located within 0.5-radial miles of the property. Seven RCRA generators are located within 0.5-radial miles of the property. The Wells G & H Site, currently a National Priority List (NPL) site, is located approximately 1,000 feet northeast of the property.

WASTE/SOURCE SAMPLING

Due to the availability of third party soil and groundwater data, START personnel did not collect any samples as part of the Whitney Barrel Co. SIP [38, pp. 1-6]. Previous sampling activities related to the contaminated soil were those performed by GHR in 1988.

During their investigation of the property, GHR excavated 17 test pits (TP-01 to TP-17), advanced 12 soil borings (B-3, B-5, B-6, and B-8), four of which were completed as piezometers (B-1, B-2, B-4, and B-7) and another four of which were completed as monitoring wells (MW-1S to MW-4S) [33, Section 4].

On 25 to 26 August 1988, 17 test pits were excavated on the Whitney Barrel Co. property. Twelve composite soil samples were collected from the test pits for laboratory analysis of 23 bulk Hazardous Substance List (HSL) metals by EPA Method 200 series, of pesticides/PCBs by EPA Method 8080, of SVOCs by EPA Method 8270, and of VOCs by EPA Method 8240 [33, p. 39]. The composite sample collected from soil boring B-1 (adjacent to TP-02) will be used as a reference sample because it is the most upgradient sample collected on the property and its concentrations are relatively low compared to the rest of the samples analyzed.

Antimony was present above background levels in five of the 12 samples at concentrations ranging from 22 to 32 ppm. Arsenic was present above background levels in five of the 12 samples; the highest concentration was in TP-12 at 415 ppm. Chromium was present above background levels in three of the 12 samples; the highest concentration was in TP-17 at 420 ppm. Lead was present above background levels in seven of the 12 samples; the highest concentration was in TP-17 at 252 ppm. Mercury was present above background levels in all 12 samples at concentrations ranging from 0.34 ppm in TP-15 to 0.70 ppm in TP-11[33, p. 54].

VOCs were present above background levels in three of the 12 samples at concentrations ranging from 7 parts per billion (ppb) in TP-13 to 711 ppb in TP-12. The other soil sample in which VOCs were present contained 31 ppb total VOCs. The compounds present in the soil sample collected from TP-12 were trichloroethene (TCE), tetrachloroethene (PCE), toluene, total xylenes, ethylbenzene, 1,1,1-trichloroethane (1,1,1-TCA), and chlorobenzene. TCE and PCE comprised over 90% of the VOCs present in TP-12 [33, p. 55].

SVOCs were present above background levels in all soil samples analyzed. The highest concentration of SVOCs was present in the sample from TP-17 at a total concentration of 24,090 ppb [33, p. 56].

One pesticide compound (chlordane) was present above background levels in six of the test pit soil samples. The highest concentration was in TP-11 at 26.8 ppb [33, p. 57]. Two PCB aroclor compounds (Aroclor-1254 and Aroclor-1260) were present above background levels in 10 of the 12 samples. The highest concentrations of Aroclor-1260 were in TP-11 and TP-12 at 46.6 ppb and 56 ppb, respectively [33, p. 57].

On 30 August 1988 through 2 September 1988, 12 soil borings were advanced on the Whitney Barrel Co. property. Four monitoring wells and four piezometers were installed in the 12 soil borings.

Composite soil samples were collected from each soil boring for laboratory analysis for VOCs and SVOCs by EPA Methods 624 and 625, for pesticides and PCBs by EPA Method 8080, and for 23 bulk HSL metals [33, p. 41]. The composite sample collected from soil boring B-1 has been used as a reference sample by START because it is the most upgradient sample collected on the property and its concentrations are relatively low compared to the rest of the samples analyzed.

Antimony was present above reference concentrations in five of the 12 samples at concentrations ranging from 22 ppm in B-2 to 30 ppm in B-6. Chromium was present above background levels in seven of the 12 samples. The highest concentration was in B-7 at 450 ppm. Lead was present above background levels in 10 of the 12 samples. The highest concentration was in B-3 at 233 ppm. Mercury was present above background concentrations in four of the 12 samples at concentrations ranging from 0.28 ppm in B-6 to 0.52 ppm in B-3. Zinc was present above background levels in seven of the 12 samples. The highest concentration was in B-3 at 170 ppm [33, p. 59].

VOCs were present above background concentrations in two of the 12 samples. PCE and acetone were the individual compounds present at the highest concentrations (13 ppb PCE in MW-1S and 17 ppb acetone in B-4) [33, p. 60]. SVOCs were present above background levels in all 12 samples. Total SVOC concentrations ranged from 160 ppb in B-4 to 16,810 ppb in B-7 [33, p. 60].

Chlordane was present above background levels in seven of the 12 samples at concentrations ranging from 1.61 ppb in B-3 to 6.3 ppb in B-5. PCBs were present above background levels in eight of the 12 samples at concentrations ranging from 0.24 ppm in B-4 to 5.37 ppm in MW-3S [33, p. 61].

Based on the analytical results of soil and groundwater samples, GHR expressed a number of conclusions and possible sources of the contamination. GHR stated that junked cars historically stockpiled over most areas of the property may be the possible source for the elevated antimony concentrations. Common uses and potential sources of the arsenic present on the property include rodenticide and defoliant compounds, paint pigments, wood treatment compounds, and alloy additives in batteries, cable sheaths, and glass [33, p. 70]. The slightly elevated lead concentrations at two soil sampling locations indicate isolated point source occurrences which may reflect the industrial use of the area [33, p. 71]. The slightly elevated lead concentrations also may be attributable to the lead-based paint used in the barrel refinishing process. Common uses and potential sources of the levels of mercury include silvering on glass, pesticides and fungicides, use as a wood preservative, and use in batteries and paint pigments [33, p. 72].

The VOCs present in soil with the highest concentrations (TCE and PCE) are commonly used solvents and degreasing compounds, and GHR concluded they were likely the result of on-site activities. All of the VOCs present in groundwater are compounds found in gasoline, solvents, and degreasing products [33, p. 73].

According to GHR, many of the SVOCs present in the soil are likely the result of incomplete vehicular combustion (exhaust), other combustion sources (e.g., fires) or petroleum products such as lubricating oils and fuel oils. Other SVOCs in the soil (trichlorobenzene, dichlorobenzene, and naphthalene) could be the result of tank cleaning activities and are also commonly used in solvents, fumigants, insecticides, and various lubricant oils [33, p. 75].

GROUNDWATER PATHWAY

Approximately 40% of the property is covered by asphalt paving or buildings. Soils on the property are characterized by densely packed fine sand and gravel fill [33, p. 18]. The mean annual precipitation for Reading, Massachusetts, measured approximately 3.5 miles northeast of the property, is 46.64 inches [21].

Bedrock beneath the site is characterized as Proterozoic in age and consisting of diorite, gabbro, metamorphosed mafic-to-felsic flow, and volcanoclastic and hypabyssal intrusive rocks [12]. The depth to bedrock beneath the property is unknown.

Groundwater occurs in overburden beneath the property at a depth of approximately 10 feet. Groundwater flow beneath the site is northeasterly towards the Aberjona River [8]. Groundwater discharge is likely to the Aberjona River based on location of the property within the Aberjona River floodplain [33, p. 17].

The primary aquifer in the Aberjona River valley is the stratified drift deposits (outwash sand and gravel) that underlie the property and surrounding area. The primary recharge source for the aquifer is precipitation and surface water infiltration. The transmissivity of the primary aquifer has been mapped as > 4,000 square feet per day (ft^2/day) with an estimated potential well yield of > 300 gallons per minute (gpm) [33, p. 48].

All or part of the following Massachusetts cities and towns are located within 4-radial miles of the Whitney Barrel Co. property: Burlington (population 23,301), Medford (population 56,702), Reading (population 22,671), Stoneham (population 22,183), Winchester (population 20,405), Wilmington (population 18,488), and Woburn (population 36,407) [7-10; 22].

There are no drinking water wells located in the vicinity of the property. The nearest documented groundwater source of drinking water is the Woburn Water Department's Horn Pond wells located approximately 2.2 miles southwest of the property [19; 22]. Woburn Municipal Wells G & H are located downgradient approximately 2,000 feet northeast of the site on the other side of the Aberjona River. These two wells are not considered as drinking water supplies because they were shut down in 1979 due to VOC contamination (mainly TCE, 1,1,1-TCA, and perchloroethylene) alleged to have originated at other industrial properties in the area [33, p. 22].

Two million gallons of water per day are supplied to the City of Woburn Water Department by the Massachusetts Water Resource Authority (MWRA) from the Quabbin Reservoir. The remaining water demand for Woburn is supplied by the municipal wells located near Horn Pond. The Woburn municipal wells are situated approximately 2.5 miles southwest of the property [19]. Since no single source in the system contributes more than 40% of the total system, the 36,407 persons served by the system are apportioned evenly among the eight sources [19; 27].

Winchester's municipal water is supplied by North Reservoir, Middle Reservoir, and South Reservoir, none of which are downstream of the property [34]. Wilmington's municipal water is supplied by eight groundwater wells located throughout the town. Since no single source in the system contributes more than 40% of the total system, the 18,488 persons served by the system are apportioned evenly among the eight sources [23; 28]. Medford and Stoneham's municipal drinking

water is supplied 100% by the MWRA [26; 35]. Reading's municipal water is supplied by nine groundwater wells, eight of which are located off Strout Avenue and the other of which is located at the end of Beverly Road. Since no single source in the system contributes more than 40% of the total system, the 22,671 persons served by the system are apportioned evenly among the nine sources [25; 29]. Burlington's municipal water is a blended system supplied by five groundwater wells and the Mill Pond Reservoir [24].

Table 3 summarizes the populations which rely on public groundwater sources for drinking water within 4-radial miles of the property.

Table 3

Public Groundwater Supply Sources Within 4-Radial Miles of Whitney Barrel Co.

Distance/Direction From Site	Source Name	Location of Source[a]	Est. Pop. Served	Source Type[b]
2.2 mi. Southwest	Horn Pond Wells A, B, & C	Woburn	15,603	3 overburden wells
2.3 mi. Southwest	Horn Pond Well D	Woburn	5,201	1 overburden well
2.5 mi. Southwest	Horn Pond Well E	Woburn	5,201	1 overburden well
2.5 mi. Southwest	Horn Pond Well F	Woburn	5,201	1 overburden well
2.6 mi. Northwest	Chestnut St. Wells 1 & 2	Wilmington	4,622	2 overburden wells
2.9 mi. Northwest	Main St. Well	Wilmington	2,311	1 overburden well
3.0 mi. North	Beverly Rd. Well	Reading	2,519	1 overburden well
3.5 mi. Northwest	Butters Row Wells 1 & 2	Wilmington	4,622	2 overburden wells
3.9 mi. North	Strout Ave. Wells 1 thru 8	Reading	20,152	8 overburden wells

[a] Indicates town in which well is located
[b] Overburden, Bedrock, or Unknown
[19; 23; 25; 27-29]

Private groundwater supplies located within 4-radial miles of the property were estimated using equal distribution calculations of U.S. Census CENTRACTS data identifying population, households, and private water wells for "Block Groups" which lie within or partially within individual radial distance rings measured from the Whitney Barrel Co. property. The nearest private well is estimated to be located between 0.25- and 0.5-radial miles from the property, but has not been specifically identified due to lack of private well information for Woburn [11]. The total population which relies on groundwater within 4-radial miles of the property is 65,933 persons and is summarized in Table 4.

Table 4

Estimated Drinking Water Populations Served By Groundwater Sources Within 4-Radial Miles of Whitney Barrel Co.

Radial Distance From Whitney Barrel Co. (miles)	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
0.00 < 0.25	0	0	0
0.25 < 0.50	3	0	3
0.50 < 1.00	12	0	12
1.00 < 2.00	91	0	91
2.00 < 3.00	166	38,139	38,305
3.00 < 4.00	229	27,293	27,522
TOTAL	501	65,432	65,933

[11; 19; 23; 25; 27-29]

On 17 October 1988, GHR personnel collected a groundwater sample from each of the four monitoring wells (MW-1S to MW-4S) that were installed on the property and submitted them for laboratory analyses for VOCs and SVOCs by EPA Method 9240/8270, for pesticides and PCBs by EPA Method 608, and for 23 bulk HSL metals by EPA Method 200 series [33, p. 44]. The sample collected from monitoring well MW-1S will be used by START as a reference sample because it is the most upgradient sample collected on the property and its concentrations are relatively low compared to the rest of the samples analyzed.

Arsenic was present above background levels in MW-3S at 0.062 ppm. Sodium was present above background levels in all four samples; the highest concentration was in MW-3S at 185 ppm [33, p. 62].

VOCs were present above background concentrations in three of the four groundwater samples with concentrations ranging from 113 ppb total VOCs in MW-2S to 938 ppb total VOCs in MW-4S. The highest concentrations were of 1,1-dichloroethane at 300 ppb, total xylenes at 180 ppb, and benzene at 63 ppb from MW-4S; and vinyl chloride at 32 ppb in MW-3S [33, p. 63].

The highest SVOC concentrations present above background concentrations in the samples were of 1,4-dichlorobenzene at 140 ppb and 1,3-dichlorobenzene at 29 ppb in MW-2S. Aroclor-1260 was present above background concentrations in MW-2S and MW-3S at 2.8 ppb and 2.2 ppb, respectively [33, p. 65]. Table 5 summarizes the analytical results of groundwater samples collected by GHR which meet observed release criteria.

Table 5

Summary of Analytical Results
Groundwater Sample Analysis for
Whitney Barrel Co.

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration	Comments
MW-2S	**VOCs**			
	Chlorobenzene	39 ppb	3 ppb	13 × Ref
	SVOCs			
	1,3-dichlorobenzene	29 ppb	10 U ppb	3 × SQL
	1,4-dichlorobenzene	140 ppb	10 U ppb	14 × SQL
	PESTICIDES/PCBs			
	Aroclor-1260	2.8 ppb	1 U ppb	3 × SDL
MW-3S	**INORGANICS**			
	Arsenic	0.062 ppm	0.011 ppm	5 × Ref
	Sodium	185 ppm	34.6 ppm	5 × Ref
MW-4S	**VOCs**			
	Benzene	63 ppb	5 ppb	12 × Ref
	1,1,1-trichloroethane	99 ppb	5 U ppb	20 × SQL
	1,1-dichloroethane	300 ppb	5 U ppb	60 × SQL
	Ethylbenzene	90 ppb	2 ppb	45 × Ref
	Toluene	66 ppb	5 U ppb	13 × SQL
	Total Xylenes	180 ppb	5 ppb	36 × Ref

ppb = Parts per billion.
ppm = Parts per million.
PCBs = Polychlorinated biphenyls.
VOCs = Volatile organic compounds.
SVOCs = Semivolatile organic compounds.
U = Indicates the sample was analyzed for but not detected, and reports the detection value.
Ref = Reference Sample Concentration
SDL = Sample Detection Limit.
SQL = Sample Quantitation Limit.
[33]

Due to the availability of third party groundwater data, START did not collect groundwater samples as part of the Whitney Barrel Co. SIP [38, pp. 1-4].

SURFACE WATER PATHWAY

Wetlands associated with a drainage swale run along the northern and northwestern portions of the property. These wetland areas, which are contiguous with the Aberjona River, remain wet for most of the year and are likely to collect property drainage. The swale is classified by the U.S. Geological Survey (USGS) as an intermittent stream and is hydrologically connected to a culvert under the unpaved road near the northeast corner of the site. The culvert eventually drains to the Aberjona River located 600 feet northeast of the property [33, pp. 18, 21].

The Aberjona River has a mean annual flow rate of less than 28.9 cubic feet per second (cfs) at the probable point of entry (PPE) to surface water. The mean annual flow rate for the Mystic River was estimated at 118.8 cfs by using the drainage basin area to calculate the flow rate [30; 36]. A USGS gauging station, located approximately 3.5 miles downstream of the PPE, has a recorded mean annual flow rate of 28.9 cfs; no additional USGS gauging stations are located on the Aberjona River [30]. Table 6 summarizes the characteristics of surface water bodies located within 15-downstream miles of the property.

Table 6

Water Bodies Along the 15-Mile Downstream Pathway from Whitney Barrel Co.

Surface Water Body	Descriptor[a]	Length of Reach (miles)	Flow Characteristics (cfs)[b]	Length of Wetlands (miles)
Aberjona River	Small to moderate stream	5.9	circa 28.9	2.0
Mystic River	Moderate to large stream	6.5	circa 118.8	0.7
Boston Inner Harbor	Coastal tidal waters	2.4	NA	0

[a] Minimal stream < 10 cfs. Small to moderate stream 10-100 cfs. Moderate to large stream > 100-1,000 cfs. Large stream to river > 1,000-10,000 cfs. Large river > 10,000-100,000 cfs. Very large river > 100,000 cfs. Coastal tidal waters (flow not applicable).

[b] Cubic feet per second.

[8; 13-16; 30; 36]

No drinking water intakes or fisheries are located along the 15-mile downstream pathway from the Whitney Barrel Co. property [31]. The Aberjona and Mystic Rivers are designated as Class B waterways by the MA DEP along their entire lengths. They are further noted as warm water fisheries along their entire lengths [37]. Approximately 2.7 miles of wetland frontage exists within 15-downstream miles of the property [13-16]. Habitats for ten State-concerned species, eight State-threatened species, one State-endangered species, two Federal-candidate species, and two Federal-endangered species are located along the Aberjona and Mystic Rivers within 15-downstream miles of the property [36]. Table 7 summarizes the sensitive environments within 15-downstream miles of the property.

Table 7

Sensitive Environments Along the 15-Mile Downstream Pathway from Whitney Barrel Co.

Sensitive Environment Name	Sensitive Environment Type	Water Body	Downstream Distance from PPE (miles)	Flow Rate at Environment (cfs)[a]
Invertebrates Insecta	State-concerned Species Habitat	Aberjona River	1.18	circa 28.9
Invertebrates Malacostraca	State-concerned Species Habitat	Aberjona River	2.23	circa 28.9
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	2.33	circa 28.9
Invertebrates Insecta	State-threatened Species Habitat	Aberjona River	2.54	circa 28.9
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	2.54	circa 28.9
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	2.55	circa 28.9
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	2.58	circa 28.9
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	2.62	circa 28.9
Vascular Plants Monocotyledoneae	State-concerned Species Habitat	Aberjona River	2.63	circa 28.9
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	2.70	circa 28.9
Invertebrates Malacostraca	State-concerned Species Habitat	Aberjona River	4.74	circa 28.9
Vascular Plants Monocotyledoneae	State-concerned Species Habitat	Aberjona River	5.89	circa 28.9
Vertebrates Aves	State-concerned Species Habitat	Mystic River	7.96	circa 118.8
Vertebrates Aves	Federal-candidate Species Habitat	Mystic River	9.77	circa 118.8
Vertebrates Aves	Fed.-endangered Species Habitat	Mystic River	9.94	circa 118.8
Vertebrates Aves	State-endangered Species Habitat	Mystic River	10.86	circa 118.8

Table 7

Sensitive Environments Along the 15-Mile Downstream Pathway from Whitney Barrel Co. (Concluded)

Sensitive Environment Name	Sensitive Environment Type	Water Body	Downstream Distance from PPE (miles)	Flow Rate at Environment (cfs)[a]
Vertebrates Aves	Federal-candidate Species Habitat	Mystic River	11.46	circa 118.8
Vertebrates Aves	Fed.-endangered Species Habitat	Mystic River	11.58	circa 118.8
Vertebrates Aves	State-concerned Species Habitat	Mystic River	11.58	circa 118.8
Vertebrates Aves	State-concerned Species Habitat	Mystic River	11.62	circa 118.8
Vertebrates Aves	State-concerned Species Habitat	Mystic River	12.23	circa 118.8
Vertebrates Aves	State-concerned Species Habitat	Boston Inner Harbor	13.08	NA
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Boston Inner Harbor	13.41	NA
Migratory Pathway for Alewife	Anadromous Fish Migratory Pathway	Boston Inner Harbor	14.00	NA
Spawning Ground for Alewife	Spawning Ground Within an Estuary	Boston Inner Harbor	14.00	NA

[a] Cubic feet per second
PPE = Probable Point of Entry

[32; 43]

No surface water sampling has been conducted on the property to date [1; 2; 6; 33]. However, soil sampling on the property documents hazardous substances in contaminated soil. The entire property, including the contaminated soil and a drum storage area, was flooded in October 1996. MA DEP contractors responded to the spill in an effort to contain waste oil which escaped from a container on the property during the flood. Therefore, an observed release is established based on direct observation [38, p. 4].

SOIL EXPOSURE PATHWAY

There is one full-time employee on the property who works for the Allen Glass Co. [38, p. 2]. Sullivan Sweeping and Dockside Dismantling employees do not work full-time on the property. There are no residents on the property; the nearest residence is located across Salem Street approximately 200 feet south of the property [33, p. 16]. The nearest school to the property is the

White School located approximately 3,200 feet southwest of the property [8]. No terrestrial sensitive environments are noted on the property [38, p. 4]. An estimated 9,806 persons live within 1-radial mile of the property [11].

On 25 to 26 August 1988, GHR excavated 17 test pits (TP-01 to TP-17) on the Whitney Barrel property. Twelve composite soil samples were collected from the test pits for laboratory analysis of 23 bulk HSL metals by EPA Method 200 series, pesticides/PCBs by EPA Method 8080, and SVOCs and VOCs by EPA Method 8270/8240 [33, p. 39]. The depths of the samples were not documented; for the purposes of this evaluation, the samples are presumed to represent shallow as well as deep soil conditions. The composite sample collected from soil boring B-1 (adjacent to TP-02) has been used as a reference sample by START because it is the most upgradient sample collected on the property and its concentrations are relatively low compared to the rest of the samples analyzed. Table 8 summarizes the highest concentrations of hazardous substances detected in the soil samples.

Table 8

Summary of Analytical Results
Soil Sample Analysis for
Whitney Barrel Co.

Sample ID	Hazardous Substance	Substance Concentration	Reference Concentration	Comments
TP-06	Antimony	32 ppm	3.2 U ppm	10 × SDL
TP-12	Arsenic	415 ppm	4.16 ppm	99 × Ref
B-7	Chromium	450 ppm	20.8 ppm	21 × Ref
TP-17	Lead	252 ppm	19.8 ppm	12 × Ref
TP-11	Mercury	0.7 ppm	0.1 U ppm	7 × SDL
B-3	Zinc	170 ppm	33.7 ppm	5 × Ref
TP-12	Chlorobenzene	250 ppb	5 U ppb	50 × SQL
TP-12 (DUP)	1,1,1-trichloroethane	2,000 ppb	5 U ppb	400 × SQL
TP-12 (DUP)	1,2-dichloroethylene	32 ppb	5 U ppb	6 × SQL
TP-12	Ethylbenzene	3,900 ppb	5 U ppb	700 × SQL
TP-12	Tetrachloroethylene	320,000 ppb	5 U ppb	60,000 × SQL
TP-12	Toluene	31,000 ppb	5 U ppb	6,000 × SQL
TP-12	Trichloroethylene	330,000 ppb	5 U ppb	60,000 × SQL
TP-12	Total Xylenes	26,000 ppb	5 U ppb	5,000 × SQL
TP-11	1,2,4-trichlorobenzene	2,000 ppb	330 U ppb	6 × SQL

Table 8

Summary of Analytical Results
Soil Sample Analysis for
Whitney Barrel Co.
(Concluded)

Sample ID	Hazardous Substance	Substance Concentration	Background *Concentration*	*Comments*
TP-17	Fluoranthene	2,600 ppb	100 ppb	26 × Ref
TP-17	Naphthalene	3,900 ppb	330 U ppb	11 × SQL
B-7	Bis(2-ethylhexyl)phthalate	11,000 ppb	230 ppb	47 × Ref
B-3	Benzo(a)pyrene	1,200 ppb	330 U ppb	3 × SQL
B-3	Chrysene	1,400 ppb	81 ppb	17 × Ref
TP-17	Anthracene	1,400 ppb	330 U ppb	4 × SQL
TP-17	Fluorene	1,600 ppb	330 U ppb	4 × SQL
TP-17	Phenanthrene	2,400 ppb	330 U ppb	7 × SQL
B-3	Pyrene	3,000 ppb	95 ppb	31 × Ref
TP-11	Chlordane	26.8 ppm	0.38 ppm	70 × Ref
TP-12 (DUP)	PCBs	94.8 ppm	0.07 ppm	1,354 × Ref
B-3	Benzo(a)anthracene	1,100 ppb	330 U ppb	3 × SQL

ppb = Parts per billion.
ppm = Parts per million.
PCBs = Polychlorinated biphenyls.
DUP = Duplicate sample.
U = Indicates the sample was analyzed for but not detected, and reports the detection value.
Ref = Reference Sample Concentration
SDL = Sample Detection Limit.
SQL = Sample Quantitation Limit.
[33]

Antimony was present above background levels in five of the 12 samples at concentrations ranging from 22 to 32 ppm. Arsenic was present above background levels in five of the 12 samples. The highest concentration was in TP-12 at 415 ppm. Chromium was present above background levels in three of the 12 samples. The highest concentration was in TP-17 at 420 ppm. Lead was present above background levels in seven of the 12 samples. The highest concentration was in TP-17 at 252 ppm. Mercury was present above background levels in all 12 samples at concentrations ranging from 0.34 ppm in TP-15 to 0.70 ppm in TP-11 [33, p. 54].

VOCs were present above background levels in three of the 12 samples at concentrations ranging from 7 ppb in TP-13 to 711.176 ppb in TP-12. The other soil sample in which VOCs were present contained 31 ppb total VOCs. The compounds present in the soil sample collected from TP-12 were

TCE, PCE, toluene, total xylenes, ethylbenzene, 1,1,1-TCA, and chlorobenzene. TCE and PCE comprised over 90% of the VOCs present in TP-12 [33, p. 55].

SVOCs were present above background levels in all soil samples analyzed. The highest concentration of SVOCs was present in the sample from TP-17 at a total concentration of 24,090 ppb [33, p. 56].

One pesticide compound (chlordane) was present above background levels in six of the test pit soil samples. The highest concentration was in TP-11 at 26.8 ppb [33, p. 57]. Two PCB aroclor compounds (Aroclor-1254 and Aroclor-1260) were present above background levels in 10 of the 12 samples. The highest concentrations were of Aroclor-1260 in TP-11 and TP-12 at 46.6 ppb and 56 ppb, respectively [33, p. 57].

On 30 August 1988 through 2 September 1988, GHR advanced 12 soil borings (B-3, B-5, B-6, B-8) on the Whitney Barrel property. Four monitoring wells (MW-1S to MW-4S) and four piezometers (B-1, B-2, B-4, B-7) were installed in the 12 soil borings. Composite soil samples were collected from each soil boring for laboratory analysis for VOCs and SVOCs by EPA Methods 624 and 625, for pesticides and PCBs by EPA Method 8080, and for 23 bulk HSL metals [33, p. 41]. The composite sample collected from soil boring B-1 has been used as a reference sample by START because it is the most upgradient sample collected on the property and its concentrations are relatively low compared to the rest of the samples analyzed.

Antimony was present above background levels in five of the 12 samples at concentrations ranging from 22 ppm in B-2 to 30 ppm in B-6. Chromium was present above background levels in seven of the 12 samples; the highest concentration was in B-7 at 450 ppm. Lead was present above background levels in 10 of the 12 samples; the highest concentration was in B-3 at 233 ppm. Mercury was present above background concentrations in four of the 12 samples at concentrations ranging from 0.28 ppm in B-6 to 0.52 ppm in B-3. Zinc was present above background levels in seven of the 12 samples; the highest concentration was in B-3 at 170 ppm [33, p. 59].

VOCs were present above background concentrations in two of the 12 samples. PCE and acetone were the individual compounds present at the highest concentrations (13 ppb PCE in MW-1S and 17 ppb acetone in B-4) [33, p. 60].

SVOCs were present above background levels in all 12 samples. Total SVOC concentrations ranged from 160 ppb in B-4 to 16,810 ppb in B-7 [33, p. 60].

Chlordane was present above background levels in seven of the 12 samples at concentrations ranging from 1.61 ppb in B-3 to 6.3 ppb in B-5. PCBs were present above background levels in eight of the 12 samples at concentrations ranging from 0.24 ppm in B-4 to 5.37 ppm in MW-3S [33, p. 61].

Due to the availability of third party soil data, START did not collect soil samples as part of the Whitney Barrel Co. SIP [38, pp. 1-4].

AIR PATHWAY

There is one full-time employee on the property who works for the Allen Glass Co. [38, p. 2]. Sullivan Sweeping and Dockside Dismantling employees do not work full-time on the property. There are no residents on the property; the nearest residence is located across Salem Street approximately 200 feet south of the property [33, p. 16]. An estimated 147,048 persons live within 4-radial miles of the property [11]. Table 9 summarizes the estimated population within 4-radial miles of the property.

Table 9

Estimated Populations Within 4-Radial Miles of Whitney Barrel Co.

Radial Distance from the Whitney Barrel Co. (miles)	Estimated Population
0.00 < 0.25	446
0.25 < 0.50	1,644
0.50 < 1.00	7,716
1.00 < 2.00	36,299
2.00 < 3.00	45,717
3.00 < 4.00	55,226
TOTAL	147,048

[11]

Approximately 2,000 acres of wetlands are located within 4-radial miles of the property. In addition, habitats for 26 State-listed species and two Federal-listed species are located within 4-radial miles of the property [32]. Table 10 summarizes the sensitive environments located within 4-radial miles of the property.

Table 10

Sensitive Environments Located Within 4-Radial Miles of Whitney Barrel Co.

Radial Distance from Whitney Barrel Co. (miles)	Sensitive Environments/Species (status)
0.00 - 0.25	Water body protected by Clean Water Act
	23 acres wetlands
0.25 - 0.50	43 acres wetlands
0.50 - 1.00	62 acres wetlands
1.00 - 2.00	One State-concerned species habitat
	258 acres wetlands
2.00 - 3.00	Seven State-concerned species habitats
	Seven State-threatened species habitats
	One State-endangered species habitat
	592 acres wetlands
3.00 - 4.00	Seven State-concerned species habitats
	Two State-threatened species habitats
	One State-endangered species habitat
	Two Federal candidate species habitats
	1,022 acres wetlands

[13-16; 32; 36]

START did not collect air samples as part of the Whitney Barrel Co. SIP [38, pp. 1-4].

SUMMARY

Whitney Barrel Co., Inc. is located at 256 Salem Street in Woburn, Massachusetts on Lot No. 37, and comprises 2.72 acres of land. Mr. John Whitney, Jr. (late husband of Ms. Ruth Whitney) purchased the property in 1949 for the purpose of operating a drum, boiler, tank, and machinery reconditioning company. From 1950 until early 1985, barrels (predominantly 55-gallon drums) were brought to the site by the truckload to be cleaned, refinished, and resold. Tanks of all sizes were also cleaned on site and then sold for scrap metal. Most barrels cleaned on the property reportedly came from food and cosmetic industries. In the earlier years of the Whitney Barrel operation, some barrels still containing waste residues were received at the property for cleaning. These residues were reportedly drained from the barrels prior to washing and contained in a drum for off-site disposal. The company later made it general practice to accept only those barrels that were considered empty, and it became company policy that barrels containing residue were rejected or sent back to their source.

During the reconditioning operations at the Whitney Barrel Co., barrels were steam cleaned with trisodium phosphate and a flake caustic wash solution. Wash water from this process was skimmed and then discharged manually to the City/Massachusetts Water Resource Authority (MWRA) sanitary sewer system via a floor drain located 5 feet inside the rear entrance of the main building. The oil and grease was skimmed off the wash water and drummed for off-site disposal. Any sludge that accumulated in the wash tank was drummed and collected for off-site disposal. Following the initial wash, barrels were steam rinsed. Rinse water was contained in the wash tank and also discharged manually to the City/MWRA sewer system via the floor drain.

A series of fires occurred at the property while the Whitney Barrel Co. was active. Woburn Fire Department records indicate that the first fire occurred in 1960. Subsequent fires occurred in 1965, 1967, 1972, 1973, 1977, 1979, and 1986. Records completed by the Woburn Fire Department for the 1977 fire reported that chemicals and residue from used barrels were the main flame spread factor. During the 1979 fire, barrels awaiting reconditioning exploded and were blown out of the building.

In June 1988, GHR Engineering Associates, Inc. (GHR) conducted a Site Assessment of the Whitney Barrel Co. property. During their investigation of the property, GHR excavated 17 test pits, and advanced 12 soil borings, four of which were completed as piezometers and another four of which were completed as monitoring wells.

A number of soil and groundwater samples were collected during this investigation. The analytical results of the soil samples indicated the presence of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and inorganic metals. The analytical results of the groundwater samples indicated the presence of VOCs, SVOCs, PCBs, and inorganic metals.

GHR concluded that the contaminants detected in groundwater and soil could be attributable to both off-site and on-site operations. Past uses of the property have been responsible for the soil contamination on the property. The substances present in the groundwater can be related to past uses of the property as well as to documented groundwater contamination at the former J. J. Riley Leather Co. located north of the property.

In October 1996, during a 75-year flood event, the entire Whitney Barrel Co. property was inundated with over 4 feet of water. During the flood, a number of barrels and pails of waste oil stored on the property released their contents on the property. The Massachusetts Department of Environmental Protection (MA DEP) was notified, and Zecco, Inc. was dispatched to the property to perform a cleanup. According to Mr. Scott Sayers of MA DEP, Zecco, Inc. absorbed as much of the waste oil as they could before allowing the rest to leach back to the soil. All of the drums that were generated by Zecco, Inc. during the cleanup were removed from the property [44].

The sources on the property were inundated during the 1996 flood event. Wetlands located along the western and northern boundaries of the property provide a direct pathway to surface water. Approximately 2.7 miles of wetland frontage exists within 15-downstream miles of the property. Habitats for ten State-concerned species, eight State-threatened species, one State-endangered species, two Federal-candidate species, and two Federal-endangered species are located along the Aberjona and Mystic Rivers within 15-downstream miles of the property. The Aberjona and Mystic Rivers are classified as warm water fisheries by MA DEP.

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